

Appendix D

Conversion Tools

D.1 Coordinates Web Converter

In the first months after the kickoff of the current effort, we found useful to develop an interactive map of the SoCAB region that could easily and visually translate the pixel coordinates of the map picture into geographical projections coordinates in the Universal Traverse Mercator system, Zone 11 (UTM), as well as the model internal coordinates.

The relationship the X and Y grid coordinates in the air quality model and the UTM Zone 11 system can be written as:

X model coordinates (range 1–80 units) to X UTM coordinates (range: 215–610 km):

$$X_{UTM} = X_M \cdot 5 + 210$$

Y model coordinates (range 1–30 units) to Y UTM coordinates (range: 3685–3830 km):

$$Y_{UTM} = T_M \cdot 5 + 3680$$

The above mentioned conversion tool was successfully developed and posted on the Internet for public access, at the following URL:

<http://albeniz.eng.uci.edu/map/>

As an illustrative example, Figure D.1 below shows the UTM and model coordinates when the city of Victorville is clicked.

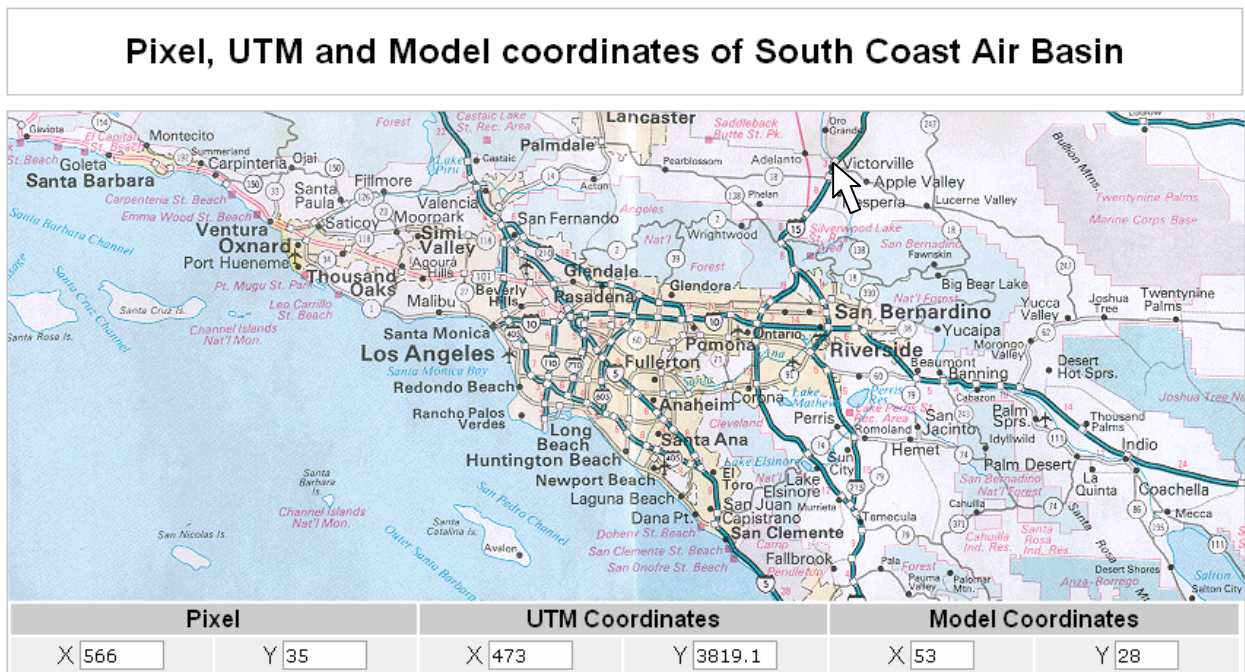


Figure D-1. UTM-Model coordinates web converter

D.2 Emission rates converter

We noticed at the early stages of the project that the emission flux units understood by the air quality model (parts per millions x meter / min) were completely different from the typical emission rates units found for distributed generator systems (pounds or kg / hour or pounds or kg/ kWh).

An emission rates converter was successfully developed in Excel to easily relate the two different emission units. The conversion factors used to ascertain how many (ppmv-m/min) of generic pollutant A correspond to x pounds of A/kWh of electricity generated are presented as follows:

$$x \frac{\text{lb A}}{\text{kW} \cdot \text{h}} \times y \frac{\text{GW}}{\text{cell}} \times \frac{10^6 \text{ kW}}{1 \text{ GW}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{1 \text{ kg A}}{2.205 \text{ lb A}} \times \frac{1 \text{ mol A}}{\text{MW A kg}} \times \frac{1 \text{ cell}}{25 \cdot 10^6 \text{ m}^2} \times \frac{8.314 \frac{\text{Pa} \cdot \text{m}^3}{\text{mol air} \cdot \text{K}} \cdot 288 \text{ K}}{1.01325 \cdot 10^5 \text{ Pa}} \times \frac{10^6 \text{ ppmv A}}{\text{mol A/mol air}}$$